What is Claimed is:

1. A modulation system comprising:

a digital signal processor that generates in-phase, quadrature-phase and amplitude signals from a baseband signal;

a phase locked loop that includes a controlled oscillator having a controlled oscillator output, the phase locked loop including therein a modulator that modulates the in-phase and quadrature-phase signals; and

an amplifier having a signal input, an amplitude control input and an output, wherein the signal input is responsive to the controlled oscillator output and the amplitude control input is responsive to the amplitude signal.

2. A system according to Claim 1 wherein the phase locked loop includes a controlled oscillator input and a feedback loop between the controlled oscillator input and the controlled oscillator output, the feedback loop including a mixer that is responsive to a local oscillator, wherein the modulator is in the feedback loop between the controlled oscillator output and the mixer, between the local oscillator and the mixer, or between the mixer and the controlled oscillator input.

3. A system according to Claim 1 wherein the in-phase and quadrature-phase signals are normalized in-phase and quadrature-phase signals, such that the modulated signal is a constant amplitude modulated signal.

4. A system according to Claim 3 wherein the digital signal processor generates the normalized in-phase signal as one of a cosine and a sine of an angle theta and generates the normalized quadrature-phase signal as the other of a cosine and a sine of the angle theta, where theta is an angle whose tangent is the quadrature-phase signal divided by the in-phase signal.

5. A system according to Claim 4 wherein the digital signal processor generates the amplitude signal as a square root of a sum of the in-phase signal squared and the quadrature-phase signal squared.

6. A system according to Claim 1 further comprising a power control signal, wherein the amplitude control input is responsive to the amplitude signal and to the power control signal.

7. A system according to Claim 1 further comprising:

a power amplifier that is responsive to the output of the amplifier having a signal input, an amplitude control input and an output; and

a transmit antenna that is responsive to the power amplifier.

8. A system according to Claim 1 further comprising a transmit antenna that is responsive to the output of the amplifier and a user interface that generates the baseband signal in response to user input, to provide a wireless communications terminal.

9. A system according to Claim 1 wherein the amplifier is a power amplifier.

10. A modulation system comprising:

a quadrature modulator that modulates in-phase and quadrature-phase signals to produce a modulated signal;

a phase tracking subsystem that is responsive to the quadrature modulator to produce a phase signal that is responsive to phase changes in the modulated signal and that is independent of amplitude changes in the modulated signal;

an amplitude tracking subsystem that is responsive to the quadrature modulator to produce an amplitude signal that is responsive to amplitude changes in the modulated signal and that is independent of phase changes in the modulated signal; and

an amplifier having a signal input, an amplitude control input and an output, wherein the signal input is responsive to the phase signal and the amplitude control input is responsive to the amplitude signal;

wherein the phase tracking subsystem comprises a phase locked loop that includes a controlled oscillator having a controlled oscillator output that produces the

phase signal and wherein the quadrature modulator is included within the phase locked loop.

11. A system according to Claim 10 wherein the phase locked loop includes a controlled oscillator input and a feedback loop between the controlled oscillator input and the controlled oscillator output, the feedback loop including a mixer that is responsive to a local oscillator, wherein the modulator is in the feedback loop between the controlled oscillator output and the mixer, between the local oscillator and the mixer, or between the mixer and the controlled oscillator input.

12. A system according to Claim 10 wherein the amplitude tracking subsystem comprises an automatic gain control subsystem that is responsive to the modulated signal to produce the amplitude signal.

13. A system according to Claim 12 wherein the automatic gain control subsystem further comprises:

a first envelope detector that is responsive to the modulated signal;

a second envelope detector that is responsive to the phase locked loop; and

a comparator that is responsive to the first and second envelope detectors to produce the amplitude signal.

14. A system according to Claim 12 wherein the automatic gain control subsystem further comprises:

a first envelope detector that is responsive to the modulated signal;

a second envelope detector that is responsive to the amplifier; and

a comparator that is responsive to the first and second envelope detectors to produce the amplitude signal.

15. A system according to Claim 10 wherein the amplitude tracking subsystem further comprises:

an envelope detector that is responsive to the modulated signal to produce the amplitude signal.

16. A system according to Claim 10 wherein the phase tracking system further comprises a limiter between the quadrature modulator and the phase locked loop.

17. A system according to Claim 10 further comprising:

a power amplifier that is responsive to the output of the amplifier having a signal input, an amplitude control input and an output; and

a transmit antenna that is responsive to the power amplifier.

18. A system according to Claim 10 further comprising a transmit antenna that is responsive to the output of the amplifier and a user interface that generates the in-phase and quadrature signals in response to user input, to provide a wireless communications terminal.

19. A system according to Claim 10 wherein the amplifier is a power amplifier.

20. A modulation method comprising:

generating in-phase, quadrature-phase and amplitude signals from a baseband signal;

modulating the in-phase and quadrature-phase signals to produce a modulated signal using a phase locked loop that includes a controlled oscillator having a controlled oscillator output, wherein the modulating is performed within the phase locked loop; and

amplifying the controlled oscillator output at a gain that is varied in response to the amplitude signal.

21. A method according to Claim 20:

wherein the phase locked loop includes a controlled oscillator input and a feedback loop between the controlled oscillator input and the controlled oscillator output, the feedback loop including a mixer that is responsive to a local oscillator; and

wherein the modulating is performed in the feedback loop between the controlled oscillator output and the mixer, between the local oscillator and the mixer, or between the mixer and the controlled oscillator input.

22. A method according to Claim 20 wherein the generating in-phase, quadrature-phase and amplitude signals from a baseband signal comprises generating a normalized in-phase signal, a normalized quadrature-phase signal and a normalized amplitude signal from a baseband signal, such that the modulated signal is a constant amplitude modulated signal.

23. A method according to Claim 22 wherein the generating a constant amplitude in-phase signal, a constant amplitude quadrature-phase signal and a normalized amplitude signal from a baseband signal comprises:

generating an in-phase signal and a quadrature-phase signal from a baseband signal;

generating an angle theta whose tangent is the quadrature-phase signal divided by the in-phase signal;

generating the normalized in-phase signal as one of a sine and a cosine of the angle theta; and

generating the normalized quadrature signal as the other of a sine and a cosine of the angle theta.

24. A method according to Claim 23 wherein the generating a normalized in-phase signal, a normalized quadrature-phase signal and a normalized amplitude signal from a baseband signal further comprises:

generating the normalized amplitude signal as a square root of a sum of the in-phase signal squared and the quadrature-phase signal squared.

25. A method according to Claim 20 wherein the amplifying comprises amplifying the phase locked signal at a gain that is varied in response to the amplitude signal and a power control signal.

26. A method according to Claim 20 further comprising:

transmitting the phase locked signal as amplified.

27. A method according to Claim 26 further comprising:

generating the baseband signal in response to user input, to provide a wireless communications method.

28. A modulation method comprising:

modulating in-phase and quadrature signals to produce a modulated signal;

producing a phase signal from the modulated signal that is responsive to phase changes in the modulated signal and that is independent of amplitude changes in the modulated signal using a phase locked loop that includes a controlled oscillator having a controlled oscillator output, wherein the modulating is performed within the phase locked loop;

producing an amplitude signal from the modulated signal that is responsive to amplitude changes in the modulated signal and that is independent of phase changes in the modulated signal; and

amplifying the phase signal at a gain that is varied in response to the amplitude signal.

29. A method according to Claim 28:

wherein the phase locked loop includes a controlled oscillator input and a feedback loop between the controlled oscillator input and the controlled oscillator output, the feedback loop including a mixer that is responsive to a local oscillator; and

wherein the modulating is performed in the feedback loop between the controlled oscillator output and the mixer, between the local oscillator and the mixer, or between the mixer and the controlled oscillator input.

30. A method according to Claim 28 wherein the producing an amplitude signal from the modulated signal comprises automatic gain controlling the modulated signal to produce the amplitude signal.

31. A method according to Claim 30 wherein the automatic gain controlling comprises:

envelope detecting the modulated signal;

envelope detecting a signal in the phase locked loop; and

comparing the envelope detected modulated signal and the envelope detected signal in the phase locked loop to produce the amplitude signal.

32. A method according to Claim 30 wherein the automatic gain controlling comprises:

envelope detecting the modulated signal;

envelope detecting the amplified phase signal; and

comparing the envelope detected modulated signal and the envelope detected amplified phase signal to produce the amplitude signal.

33. A method according to Claim 28 wherein the producing an amplitude signal from the modulated signal comprises:

envelope detecting the modulated signal to produce the amplitude signal.

34. A method according to Claim 28 further comprising limiting the modulated signal, and wherein the applying the modulated signal to a phase locked loop comprises applying the limited modulated signal to a phase locked loop that includes a controlled oscillator having a controlled oscillator output that produces the phase signal.

35. A method according to Claim 28 further comprising:

transmitting the amplified phase signal.

36. A method according to Claim 35 further comprising:

generating the in-phase and quadrature signals in response to user input, to provide a wireless communications method.